

## FUNDAMENTALS OF ENVIRONMENTAL PROBLEM AND TRANSFORMATION OF SCIENTIFIC KNOWLEDGE IN ENVIRONMENTAL KNOWLEDGE

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This research studies the complex of concepts: the natural and the artificial, civilization and culture, natural forces and human forces, natural processes and induced processes. These binary concepts generally reflect the historical experience of the interaction of man and nature, the results of which are before the eyes of people themselves, and represent the level of development of human life in nature and society. Analysis of these results is performed by the activity method. The considered binary concepts reveal the continuity of matter and natural processes in practical and cognitive activity of man, i.e., the systematic property of interaction between man and nature. Mining is the process of extracting natural material from direct contact with the ground; induced natural processes obtain their origin: the extracted matter is converted into raw material, and nature - into the artificial nature. To adjust production activities in order to prevent natural and social consequences, it is necessary to transform the scientific knowledge used in this activity into environmental knowledge, and expand the scope of activity drivers, complementing it with incentives related to environmental knowledge.

**Key words:** environmental problem, transformation, interaction, natural, artificial, induced process, activity

### INTRODUCTION

Environmental problem in Russia, as well as in many countries of the world, is regarded as one of the economic and social problems. Environmental concepts and measures to prevent environmental crimes are listed in the Codes, including the Criminal Code of the Russian Federation. However, for the school education, they have to be adapted in order to facilitate the development of teaching materials and enriching personal experience of students on the basis of which the environmental knowledge is formed along with the scientific picture of the world, allowing them to expand the horizons of knowledge in environmental issues.

Criminal law cannot be regarded as the main means of the environmental protection; it is a consequence of the fact that the state of nature is reflected in living conditions, people's health, causing genetic abnormalities. The preventive function of criminal law banning dangerous encroachments on the environment and criminal penalties significantly constrain environmental contraventions. Understanding the need of legal support for nature protection measures is a necessary step, however, it does not reveal the nature of environmental problem, and highlights only acute stage of development. This understanding, late in the

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sense that the impact of our production operations, have appeared unpredictable and are reflected in the generation of health affected people and in the form of legal prohibition and regulations this understanding shows that the development of psychic reflection of people (consciousness), as well as the psyche of animals, falls short of development. The transition to the human forms of life, to the human work activity, social in its origin, fundamentally different in its structure, marked the transition to the human psyche, which is consciousness. With the transition to the human the development of psyche begins to obey the laws of social and historical development.

The basis of the human appearance lies in labor emergence and the formation of the human society on its basis (Leontjev, 1981). What feature of labor leads to unpredictable consequences, threatening human life itself? In order to answer this question, we must study the elements of labour activity: conditions for performing this activity. Common to all forms of psyche, including mental activity of animals, is the fact that the mind acts as a necessary component of vigorous activity; the animal activity is limited only by adaptation to the world around, but this adaptation is active. Man's consciousness not only reflects the objective world, but creates it. Mental activity is based on the model of external action. Mental activity is derived from the external objective activity and is the activity serving process (Galperin, 2003). Specific to human higher mental functions are derived from the forms of verbal communication between humans and are mediated by signs mostly by signs of the language.

It turns out that at each stage, thinking, in its formal content and in the composition of its operations, as it were behind the current practical activity (Galperin, 2003). This is the fact of extreme importance, but taken in isolation, it can easily gain excessive generality and then leads to misunderstandings. The similarity between the intellectual and practical work methods indicates their real connections in the past, but remains external and formal similarity in the present.

### **The present environmental problem and education**

Introduction of environmental science in the education system brings up to date the review and interpretation of the traditional areas of education (Sean & Singletary, 2008). Due to the necessity of universality, comprehensiveness and continuity of environmental education the means of implementation of principles of succession in the formation of ecological culture of students at all stages of education, from preschool to higher education institutions are brought to the forefront (Nikolaeva, 2001; Petrosova, Golov, & Sivoglazov, 2000). The elements of a holistic view of the outside world and the foundations of environmental education are included in the content of the course "The world around us" in elementary school (Mironov, 2013). Environmental awareness and education, as well as the environmental problem affects all aspects of life, calls for the formation of environmental

consciousness as a system of relations (Medvedev & Aldasheva, 2001), the use and development of additional concepts (Kudryavtsev, 2013; Russ et al., 2015) and integration of different fields of education (Sean & Singletary, 2008).

There arises a problem of advanced studies, evaluation of the expected effects and the transformation of scientific knowledge in environmental knowledge.

### **The relevance of the study of the basic ecological processes**

The current stage of the ecological problem development is aptly described by N.N. Moiseev (2000) that “a man has come up to the limit, which can not be crossed under any circumstances. One misstep - and humanity slips into the abyss. One hasty movement - and the species *Homo sapiens* may disappear from the face of the earth” (p. 11). It is necessary “to realize and implement in the activity a new guiding principle of civilized paradigm - consciousness determines being” (Glazachev, 1996). The new educational paradigm and the formation of ecological culture of pupils are based on the complex of knowledge, particularly of natural sciences as having a high ecological potential. Currently, however, the system of support concepts by means of which it would be possible to disclose the ratio of natural science and environmental awareness is not developed. Transformation of scientific knowledge into environmental knowledge, the development of effective methods meeting the objectives of the advanced training and education, is an actual pedagogical problem. In this regard, there is need to expand the system of concepts that allow analyzing environmental problem and human activities, which recreates life conflict in the interaction of man and nature.

### **The objective of the system of environmental and science education**

The main objective of environmental education is to educate in people the need to foresee all the possible environmental effects at the development of all areas of scientific and technological progress and industrial activity planning, to take practical measures to prevent these effects.

Despite the large range of the ecological relations study, the formation of ecological culture should be regarded as “making” process. For the conditions of Russia, we should note that in the textbooks for the course of “Methods of teaching integrative course “The world around us”” the content and features of the training (field) practice organization provided for the implementation of the basic education of the graduate training program for the qualification of primary school teacher is not developed (Kozina, 2004). Training (field) practice is often limited by a trip to nature, or is replaced by another activity.

The mental reflections offer even less of what is in their physiological basis, physiological reflection of the situation (Galperin, 2003). Such elements as the motives, images and actions in terms of images make up the unity of the mental activity of the subject. Effective use of ideal actions suggests that their

performance in terms of images, i.e., purely indicative performance, receives a positive or negative reinforcement, the result. This reinforcement serves as a criterion on which they are evaluated, accepted, corrected and stored or discarded. Therefore, the problem of the real value of mental activity depends primarily on the answer to the question: is it possible to prove objectively the existence of a purely indicative reinforcement? The existence of a purely indicative reinforcement, on which you can bring up a new, solid conventional bond is stated experimentally.

The main provision of trial and error method is that successful tests are fixed, and the bad ones are eliminated. However, a consolidation of successful actions is totally insufficient for providing its more frequent appearance and final approval; we need one more, at that the actual psychological factor - the more complete and subtle account of the role of small changes in the conditions of action, its more precise fitting to these conditions and the increasing actions adaptation to them - before implementation, in terms of image. We should note that this requirement mainly refers to the unsuccessful attempts; if they are simply discarded, it creates complete uncertainty on what the next action test should be. It is important not to discard an unsuccessful action test, and take into account the deviation of actual results from the set one and write essential addition to the characteristics of the failed test; it is necessary to decide whether a new test is approaching the goal or moving away from it, what amendment you need to make in order to achieve the goal in the following sample, or at least to approach it.

The same applies to the use of the formed actions. Only exceptional cases precisely reproduce the relation between subject and object, in which the last time action was successful. To get success by this action, this action is necessary to try first - in terms of perception - to make the necessary adjustments, to adapt to the changed conditions. When the correct action and its terms are known in advance and are present in the material form (in the form of a computer program), the control unit can ensure a successful implementation. When the correct path or amendment are not known, to identify them initially and manage the implementation of the action by comparison its actual progress with the planned one is possible only by means of orientation in terms of image. Mental reflection of the action field and relating its actual and given course in terms of the image constitute a compulsory condition for the successful implementation of the action which is not ensured with necessary consistency of conditions. This is a prerequisite for learning, including learning through trial and error.

The significance of the psyche and consciousness of people in social life should be discussed more thoroughly due to the fact that industrial activity, along with targeted outcomes causes unintended consequences, which destroy beneficial effects of labor (Engels, 1982).

**The aim of this work is the expansion of the conceptual apparatus of the environmental problem analysis**

Often the discussion of the environmental crisis is based on the fact that it is generated by technological progress. Hence the simplistic approach to solving the ecological crisis: it is enough to make appropriate adjustments in the direction of progress. However, Derebo and Yasvin (1996) point out that the ecological crisis, in this case “is conceived as something external to a person, rather than as something that lies within themselves ... But the effectiveness of any measures taken for the protection of nature, is ultimately determined by the behavior of people who interact with it, their attitude to nature”.

Which side of the interaction of man and nature is reflected weak and is not covered by the direction of life itself and human activity? This approach orients the overcoming of the current stage of development of the ecological problem at the psychological analysis of the process that takes place between man and nature. We need to “comprehend psychologically the categories, most important for building a consistent system of psychology as a concrete science of the generation, the operation and structure of the psychic reflection of reality, which mediates the life of individuals” (Leontjev, 1975). What causes the necessity for psychological analysis of the reality reflection in terms of overcoming the environmental problem?

In studying the current stage of development of environmental problem the evident fact, not requiring special research, is one that humanity is transformed into the main geology-shaping force. “It must be also recognized that as a result of human activities the natural balance of natural cycles is disturbed, and there are no the known methods to recover it” (Moiseev, 2000). The psyche of man is orienting, planning part of human activity. What is considered poorly in it or not considered, what is consciousness limited in comparison with the mediated by them activity, where a mismatch occurs in their relation?

**MATERIALS AND METHODS OF RESEARCH****General characteristics of the method**

The main method of the research of the conceptual apparatus of the ecological problem is the analysis of the interaction processes occurring in both the living and inanimate nature. It is necessary to highlight the processes of life, taking into account the peculiarities of life without psyche (plants) and with psyche (animals and humans).

Particularly significant is the analysis of human life - the life of society and nature. Social activities and consciousness are the elements of the interaction of man and nature by means of a comprehensive system of promoting the very nature in human activity - the system of human forces replacement by the forces of nature. This system presents a mechanism of interaction between man and nature, meeting

the restoration of the lost natural living conditions as a result of transformation of the natural foundations of life in the artificial nature. There forms an idea that the current system of substitution of human forces by nature forces (technological revolution, technology) is a source of environmental problem: it causes the depletion of natural resources, enhances the development stages of the environmental problem and degrades the natural conditions of life. The system to promote nature serves as a way to overcome the economic and environmental problems of human life and has a great background of the development of cooperation of animated and inanimate nature. It is woven into the history of human society, involved in a human society, being distributed specifically in the society, depending on the ratio of productive forces and industrial relations. The process, linking man and his environment, is the process of life.

Environmental issue affects all aspects of animated and inanimate nature. Revealing the sources of general environmental problems is impossible if based only on biology, the study should be subjected to all the sides of human interaction with nature on the basis of all natural science and social science system.

#### **Systems of interaction in animated and inanimate nature**

The interaction processes inherent in living nature, are different from the interaction processes in inanimate nature. Energy process in living bodies occurs as dissimilating-assimilatory process of exchange with the environment and as a process of continuous self-renewal. In life phenomena there is the process of the body's absorption of substances assimilated by it from the external environment, and the process of allocation of dissimulation products. Living interactive body is a whole by itself due to the fact that some of its particles disintegrate and re-emerge. The reaction of the organism to the external influence happens due to the energy released by the decay of their own substance (through dissimulation), and the body material is recovered, ultimately, at the expense of substance and energy of the environment (through assimilation). Termination of assimilation is the end of life; even in the case of starvation, assimilation does not stop, it occurs due to the transformation of their own substance from less significant parts of the body, consuming itself.

#### **Activity processes**

The specific processes that perform some living, i.e. active attitude of the subject to reality, are named in contrast to other processes, the process of activities (Leontjev, 1981). Any activity of a living being is directed to an object; non-objective activity is impossible.

The condition of any change, characteristic of a living organism under the influence of the environment is an activity that must be implemented by the organism itself. This activity is a process of irritability, it is produced by the energy

of dissimilation of the body's own substance, which recovers through the absorbed substance and energy from the environment.

The process of self-renewal is not the only process in the living body, but it is an essential process; all other living matter functions flow from it: maintenance of life, growth, reproduction. The property of self-recovery is a special quality form of the living body existence, i.e., a general property of any living body. Coming under the influence of nature impact in the state of activity is the property of irritability of living organisms; this property is essential for metabolism, life itself. The activity in unicellular organisms consists of the processes of movement, intermediate transformation, dissolution and immediate digestion of assimilated substances, growth and release of unutilized balances.

It is important to note that the mental reflection of reality is its subjective image; it means the image belonging to the real subject of life. The subjectivity of the image includes the concept of partiality of the subject. Therefore psychology studies and describes the dependence of perception, idea, thinking on "what a person needs" - on his needs, motivations, attitudes, emotions. The mental image is a product of living, practical ties and relations of the subject with the objective world; it is a product of the subject's activity in the world. Activity realizes the life of a bodily subject and, above all, is a practical process. The basis of cognitive processes is not an individual experience of the subject, but the complex of human practice. Therefore, not only thinking, but human perception greatly exceeds with its wealth relative poverty of his personal experience (Leontjev, 1975).

The activity consists of two parts: the external activity and internal activity. The main role in the development of views on the origin of internal thought operations is played by a notion of interiorization, the theory of stage formation of mental actions (Galperin, 2003). A certain thought, being a psychological phenomenon, is nothing but a substantive action, transferred to the internal, mental plan and then bygone into inner speech, where it is not available for introspection. This conclusion substantially changes our understanding of the nature of thinking and approach to psychological research. In social conditions, providing all-round development of people, mental activity is not isolated from practice. Physical labor, carrying out the practical transformation of the material things, increasingly includes performing complex mental activities; work of contemporary researchers is a particularly cognitive mental activity, increasingly accompanied by processes which by the form present external actions. A unified activity presupposes the existence of constantly occurring transitions in opposite directions of internal and external components of activity. External and internal activities have the same general structure.

Activity of a subject – external and internal - is mediated and regulated by the mental reflection of reality (Leontjev, 1974). What in the objective world appears for the subject as the motives, the objectives and conditions for their activities

should be perceived, imagined, understood, retained and reproduced by a subject in his memory; the same applies to the processes of his activity to himself - to his states, properties, characteristics. The problem of mental processes exercitation turns into a problem of their origin, their generation by public relations, in which a person enters in the objective world. But it is not non-objective relations making up the solution of the problem, that are psychological, but the orientation at these relations. The subject matter of the situation and substantive processes in it (physical or ideal) are not psychological by themselves, but they are involved in orienting activity. We should note that a certain orientation at the subject content by means of certain substantive processes is a psychological source, disappearing out of the orienting activity. To overcome the environmental problem in the form of solving the problem, we should note that the image in question viewed out of the orienting activity, can not be understood: it acts as perfect and characterized only negatively - as non-material, opposing to matter and in such a form as the primary and inexplicable. "In order to go beyond this opposition, it is necessary to study the formation and existence of the image within the activity, comprising which he performs a specific useful role". (Galperin, 2003). This activity is only the orientation of behavior. The image is not only used in it, but also arises because there inevitably comes a stage (in phylogeny), when the reaction of the organism in the environment can no longer be successful if they are not oriented to the subject, which is not the direct object of conduct. It is as it were missing, but is one the behavior will meet in the next moment. This orientation to the vacuous is possible because the body has its physical reflection. The most important thing for us is that for these reactions a physical reflection does not serve as an object itself, but the reflected object, the orientation to the original by its physical reflection and leads to a reconstruction of the image of the subject; orienting activity recreates its image and uses it. The implemented activity is more saturated, genuine than its preceding mind. Studying the original by its physical reflection and identifying its causes is the goal of the work, partially reflected in this article.

### **Mental reflection of the external environment**

In the evolution of organisms along with irritability in relation to the impacts directly necessary for the maintenance of life the body acquires sensitivity functions, i.e. sensations, orienting the body in the environment, performing a signaling function. Accordingly, there is a split of activity itself. This identifies the processes directly related to the maintenance and preservation of life that make up the original form of the activity of organisms, which are based on their primary irritability. This also shows the processes that are not directly responsible for the maintenance of life, but only mediating the body relations with those properties of the environment, on which depends the existence of the living. These processes constitute a particular



form of life that underlies sensitivity of organisms, mental reflection of the environment properties.

What was the way dependence of the result of external influence on the body on its state and related processes formed? Dependence of the states and processes of the body worked out for a long time under the influence of repeated impacts of the environment on the body and is presented in the form of their ability to adapt. The organization of a living body itself and its activities are a reflection of objective properties of the environment. Mental reflection is aimed at maintaining the self-renewal process and the preservation of the living body in the difficult conditions of life, directing it into the environment. At this point it should be noted that mental reflection occurs during the development of the simple irritability. For a living organism a necessary condition for its change consists in the fact that it carried out an activity in connection with the given influence.

The reflected world is divided into two parts: the internal medium of the body, and the external environment of its life; these substantially different parts of the objective world receive significantly different mental reflection. The internal medium is reflected in their needs, feelings of pleasure - displeasure, i.e., in a general sense. The external environment is reflected in the sensual images and concepts. The internal state of the individual are reflected mentally through their evaluation of the direct experience of states caused by internal stimuli; mental reflection is associated with impulses to action. Mental reflection of the environment is significantly different from the mental reflection of internal states.

The need from the beginning outlines the "ultimate goal" and at the same time encourages the individual to seek, but it does not define the operational content of the action itself. The choice of the way, the determination of the specific content of the action or actions' adaptation to the existing conditions becomes a special task, the task of orienting-research activity. The body arouses an active contradiction - the requirement to act, but not automatically, as the body is able to do, but as something else, and it is not clear how (Galperin, 2003). And as one of the way out of this contradiction mental reflection of a situation is formed. Mental reflection turned the inalienable property of animals. It is important to note that the psychic reflection is the subject of various sciences. The world is represented in the mental reflection in images, i.e., with properties that are essential for the action, perform perfectly. This picture is used in the world of mental activity - orienting activity, without which no other part of the activity in the future can be performed. The mental picture itself is the result of initially practical activity; it can reflect the state of the world in whole or in part. If the activity transforming nature, in a timely manner is fully reflected in the corresponding mental picture, the natural and social consequences of this activity are subject to the control and regulation, thereby environmental consequences are prevented or weakened.

It should be specially noted that in order to get the full picture of the activities reflection, it is necessary to perform a theoretical analysis of all sides of the production intervention in the natural and social processes, or perform research.

Objects of the world in this form only appear; they do not work and do not determine the specific content of the action. They open up as a condition of the action, not as acting factors. Instead of the interacting bodies' field the world opens in front of the individual due to the reflection in the images as an arena of their possible actions, i.e., of those, each of which can be scheduled first, and then tested, and only then, either rejected, or accepted to perform with or without amendments. Through the representation of the world in the images the properties of things can be taken into account in advance and at the same time to schedule different actions, therefore the individual is offered a choice-based action. Only in a system of meaningful objective activity of the subject psychic reflections receive their natural place. The inclusion of psyche in the system of sensible objective activity is justifiably one of the central ideas of the "problem of activity" in psychology.

The psyche, precisely orienting activity, is an important auxiliary behavior instrument, the one to control it. Orienting activity, or rather is orienting component of the activity occurs at the level of animals, when as a result of their mobility and the increasing inconstancy of relations between them and the objects in the environment the animals find themselves in constantly changing, individual, single situations. There is a need to adapt the actions to these one-time conditions. This adaptation is achieved by trying on, extrapolation and correction of actions in terms of the image of the current situation; this is a life function of orienting activity, i.e., mental activity. If we consider a single unit of behavior – a single action - in terms of whether the action result supports its producing mechanism, the general line of the evolution of the action - from the inanimate world to the human - can be schematically divided into four main stages characterized by the type of action: the physical action (mechanism producing action, indifferent to its results), the physiological effect (plants), the action of the subject (animals) and the action of the individual.

Each higher stage of action necessarily involves the previous stages. The stage of physiological action involves physical interaction and physical mechanisms of action. Animal stage includes physiological mechanisms to ensure only the physiological interaction with the environment, but they have the built above physiological mechanisms of the highest order, performing mental reflection of the objective world and the psychological control of actions.

The individual stage includes physical, physiological and psychological mechanisms of behavior, but they are subject to the regulation of action based on the consciousness of social values of the situation and social means, patterns and modes of action. Every higher form of action can be studied from the point of

participating in it more simple mechanisms, but this is not enough essentially, since the development of the higher from more simple is due to their inclusion in new conditions, in new relationship. The emergence of single changing situations causes the need to adapt the available responses in terms of image. The emergence of social forms of joint activity necessitates the formation of labor and speech, as well as that of social consciousness.

### **The life of man in nature and society**

Work the activity performed with the use of the instruments of labor - the system of human forces replacement by the forces of nature, and it is performed collectively, socially. Social activity involves the distribution of labor between the team members in the form of individual actions. The appearance of actions is the basis of consciousness, emergence of a reasonable sense of what human activity is directed at. The meaning of the action determines the rationality of its implementation; the meaning is established as the attitude of a human to the group of social activities. Carrying out his action a person is focused on the team in terms of the attitude of team members to his action, and purpose; and a person makes decision on his actions. From the hands of other participants in social life, he gets his earned share. This attitude is carried out by other people's activities; the connection of the motive with the subject of action does not reflect the natural but social ties and relationships.

Specifically human form of reflection of the world around - consciousness - is the reflection in the form of relationships of people in the society, the outside world objects are perceived by man as objects of a certain activity - relationships and ties. The significance of the group, of collective activity in the life of every man is recognized as a reasonable sense of his actions. The activity of people is separated from the objects and realized as their attitude. The very nature - the objects of the world - stands in a stable attitude to the needs of society in its activities, i.e. as an object of meeting certain human needs.

"In order to produce, people enter into definite contacts and relations, and only within these social contacts and relations does their attitude to nature exist and production takes place." The psyche of the person is subject to the laws of social and historical development and poorly reflects the actual state of nature; the realization of this fact is the basis for the organization of production activities in order to prevent its unfocused effects, to transform into a motive eradication of these effects.

### **The concepts of natural and artificial**

The concepts of natural and artificial formed in science long time ago. Aristotle (1976), considering the scope of use of the terms "natural" and "artificial", to his question, what is the nature, says that ... "and the essence of [artificial things] is in some respects essence ... Nature, or essence, in the primary and proper sense is the

essence, namely the essence of what has a movement beginning in itself as such: the matter is referred to as nature because it is able to take this essence, and the emergence of various kinds and the growth are called the essence because they are movements coming from this essence”.

Using the binary concepts “natural” and “artificial” Ya.A. Komensky (1982) built a natural-based psychology didactics. In the “Great didactics”, he notes that the method of teaching should be transformed into art and “it is based on natural and artificial parallelism”.

Yakupova and Gaisin (2004 when studying the basis of the method of teaching and learning by Ya.A. Komensky found that holistic continuity basis of human activity is nature, natural processes.

### **Continuity of processes and substantial nature in human activity**

People and the products of their labor, i.e. artificial nature, become the carriers of the continuity of nature. The question of establishment of science of the artificial, i.e. the science of man-made objects, for the first time was clearly put by Simon (1996): “The world we live in today is much more a man-made or artificial world than it is a natural world. Almost every element in our environment shows evidence of human artifice” (p.2).

Simon (1996), for example, points out that:

These examples set the terms of our problem, for those things we call artifacts are not apart from nature. They have no dispensation to ignore or violate natural law. At the same time they are adapted to human goals and purposes. They are what they are in order to satisfy our desire to fly or to eat well. As our aims change so too do our artifacts and vice versa. If science is to encompass these objects and phenomena in which human purposes as well as natural law are embodied, it must have means for relating these two disparate components. The character of these means and their implications for certain areas of knowledge of economics, psychology, and design in particular are the central concern of this book (p.3).

However, Girenok (1987) highlights another aspect of the problem of the artificial; the world of the artificial has developed connections that are not mapped and are steadily reproduced regardless of wishes and will of man. He noted that no one sets a goal to produce wastes, but they are produced. This aspect of modern life is clearly expressed by Derebo and Yasvin (1996): “In the meantime, the state regulation of the natural environment condition is compulsive and therefore can not solve the problem of its destruction: nature protection turns into war between the state and man-producers” (p. 5).

Komensky (1982) was one of the first (1592-1670), aware of nature as a basis for the continuity of human activity, and Rousseau (1981) was the first (1712-1778) to realize the gap between man and nature. General in their teaching activities is following nature itself. Rousseau (1981) pays serious attention to the relation of natural and artificial in the upbringing of young people, giving priority to direct

communication with nature and describes the artificial, which may lead to the contrast, not provided in the education goals: "Everything degenerates in the hands of man. ... He does not want to see anything the way nature created it - including man: he needs to train a person, to bring up to hand, ...like he trimmed a tree in his garden" (p. 24]. He deeply understood that humanity can not refuse from such an artificial life, so noted promptly that "without it everything would have been even worse."

The concepts of "natural", "artificial", "continuity of matter and the natural processes in human activity" cover all aspects of the interaction of man and nature and have passed a long way of development.

### **Culture and civilization**

Overview of definitions of "civilization" and "culture" concepts in the literature and encyclopedias reveals the wide range of their contradictions (White, 1959). Therefore, identifying their common genetic basis and development is more appropriate for the analysis. The interaction between man and nature is changing both nature and people. All changes in the nature, occurring in this interaction, constitute civilization, all changes in people is culture. Civilization and culture in this definition present the historical development of the system of human interaction with nature. This definition is an extension of the concepts, given by Girenok (1987) "In other words, civilization - is the material conditions of social existence, created by man. In this sense, we distinguish civilization from culture and society" (p.7).

Any change, of both nature and man, in this interaction is a process performed between nature and man, and in this sense, civilization and culture are identical. Their genetic identity is at the heart of all the confusion of these concepts. Categorical difference is that civilization relates to nature, culture relates to person.

### **System of man force replacement by forces of nature**

System of human interaction with nature contains important subsystem - the system of human forces replacement by forces of nature - the instruments of production, by means of which people affect the subjects of labor and convert them. The system of human forces replacement by the forces of nature is the most important of all the means of labor. The subjects and instruments of labor constitute the means of production. Created by society means of production is productive forces, represented, above all, in tools and people. The relationship of people in the production process is the relations of production, which, together with the productive forces constitute the method of production.

The system of human forces replacement by the forces of nature constantly wears out. Its restoration and development takes huge natural resources and sources of energy. The productive forces of society, in fact, are natural forces. "The

technological mediation of relations between man and nature forms the artificial structure of the natural human environment, changes and reproduces in a modified form the regime of natural processes and at the same time forms the structure of human labor" (Girenok, 1987). The side of the individual's consciousness, which is determined by his own attitude to the natural conditions of life, represents an ecological sense.

### **The basic law of action development process in the environmental issue**

Processes in which the object does not match the motive are called actions. "Depending on what action is included in activity, it receives particular psychological characteristics. This is the basic law of actions development" (Leontjev, 1981). The direct application of this psychological law requires a number of new concepts. The question arises: how to include the action in the activities? What is the meaning, rationality of this inclusion? What is the action, preventing the natural consequences of the consumer goods production? How to determine the subject (goal) of this action? What are the natural processes that produce these effects? The questions are manifold.

### **Process of formation in nature and its continuity in human activity**

Any natural processes are accompanied by the spatial movement of material nature, i.e., by natural formation process. In practical activity a person manifests the continuity of natural formation processes; labor is the process of formation, successively assigned to man from nature. To see this, we should consider the question: by what actions and movements of the body a person performs his practice?

The practical human activity can be reduced to a very simple operation. In fact, a person can only do one thing: to produce motion, move things, to bring them closer to each other or separate from each other; the rest is done by the properties of nature. By using labor and machines effect can be enhanced by skillful distribution of operations, namely by separating interfering operations from each other, and connecting all the operations that one way or another can assist each other. Users can not perform many different operations with the same quickness and dexterity with which they are due to learn the skill to carry out a small number of operations (Marx and Engels, 1956).

A man himself does not directly take part in the processes of nature, which he gives them back in the changed conditions. He often does not know the nature of these processes, but he perfectly understands the useful results of these processes. A man does not take into account the origin of inappropriate consequences that have an effect through gradual repetition and accumulation. The historical consequences of these processes are before his eyes, and the idea of the currently forming processes is reached in his mind.

A man with the help of elementary operations, movements of his working organs reaches a set of results, determined by his ability to create a variety of conditions (production, processing) of these natural processes development.

### **Induced processes**

A man in his practical activity performs actions shaping nature. He separates a substance, entering the production process from the natural basis and gives rise to new processes of nature in the basis and in the separated part of the natural substance, called induced processes (Yakupova, 2005). The withdrawn from the base material transformation processes meet the appropriate production processes; inappropriate induced processes that accompany the production and their results are in certain degree foreseeable. Induced processes, the beginning to which is given in the natural basis by a man, and their effects often remain hidden to human or beyond the production control. Such uncontrolled, unregulated induced processes cause unpredictable consequences and environmental disasters (Engels, 1982). Reliable research of all kinds of induced processes, creation of reliable control systems and evaluation of their consequences constitute the content of the environmental needs.

### **Transformation of scientific knowledge in environmental knowledge**

The very production of artificial living conditions originally took shape as a way of overcoming environmental problem of necessity to replace wasted initially natural prepared conditions of society existence. It can be said in a sense that all natural sciences are ecological knowledge. To establish the scope of the environmental component of the motives of this particular activity we must proceed from the leading, production activity motive and to consider the actions and included in them knowledge, implementing this industrial activity.

The industrial action leads to the expected objectives and consequently causes other induced changes of nature. The mapping of knowledge about industrial actions and knowledge of the processes induced by these actions is a transformation of one kind of knowledge into another, ecological knowledge. The assumption of this environmental knowledge predetermines induced processes in the natural basis necessary for their prevention, i.e. environmental motive, which extends the scope of the motives of production activities is determined. According to the basic law of the action development the structure of the industrial action is corrected, changes that satisfy the specified environmental motive are made.

## **RESULTS AND DISCUSSIONS**

At the present stage of development economic and environmental issues have acutely demonstrated their common genetic basis - the process of transforming the nature into the artificial nature. Restoring the lost natural living conditions by transforming the very natural foundation of life has acquired such dimensions,

beyond which it becomes a source of depletion of natural basis and deterioration of the natural conditions of life. The problem of the relation of nature and society manifested itself in its own system of interaction of man and nature, and not in the subsystems 'society' and 'nature'. In this connection the problem of knowledge transformation - the natural sciences in the environmental clearly manifested itself (Yakupova, 2005; Malhotra, 2002) in the field of education. Transformation of knowledge is an element of the world cognition. The mastering of any subject includes three processes that take place almost simultaneously: 1) receiving new information; 2) the transformation of knowledge; 3) verification of the adequacy degree of the applied means of handling the information contained in the task (Bruner, 1974). Transformation of existing knowledge in the environmental knowledge aims to overcome the current ecological and economic problem and performs similarly to the transfer of one problem statement to the other problem statement. Transformation of natural science and social knowledge in the environmental problems is essentially a development of the most general mode of action – solution for a class of problems and in this sense is similar to the formulation and solution of educational task in the course of 'The world around' in training by didactic system of Elkonin and Davydov (Chudinova and Bukvareva, 2002). The questions of relations transformation are resolved by studying the relations of various environmental relationships with firmly established binary relations (Binngieâer Randler, 2015).

The concepts "natural" and "artificial", "living" and "inanimate" are practiced in the first form, and the processes, conditions of processes, essential and non-essential conditions, natural and induced processes are integrated into curriculum of the second form course of elementary school 'The world around'.

## CONCLUSION

Modern stage of environmental issue supported a deep analysis of various aspects of interaction of man and nature, the revision of a number of existing concepts of 'natural' and 'artificial', 'culture' and 'civilization', 'man in nature and society', 'system of human forces replacement by forces of nature', 'the process of formation in nature' and 'induced processes', 'reasonable induced processes' and 'inappropriate induced processes', development of a method for the transformation of scientific knowledge in environmental knowledge based on human activities analysis by the basic law of the action development as a unit of activity. The existing traditional concepts of ecology (biological) and complementary concepts, discussed in this article, together with the theory of human activity constitute an instrument system of environmental and economic problem analysis. This activity approach to the study of contemporary environmental problem simplifies the analysis of the problem and allows you to uncover its essence in the course of 'The world around' in the elementary school and higher school as a result of easily perceived notions of the theory of activity.



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